



Mines to Mobility Conference

Vale's Low Carbon Journey and the Green Energy Vehicle Program

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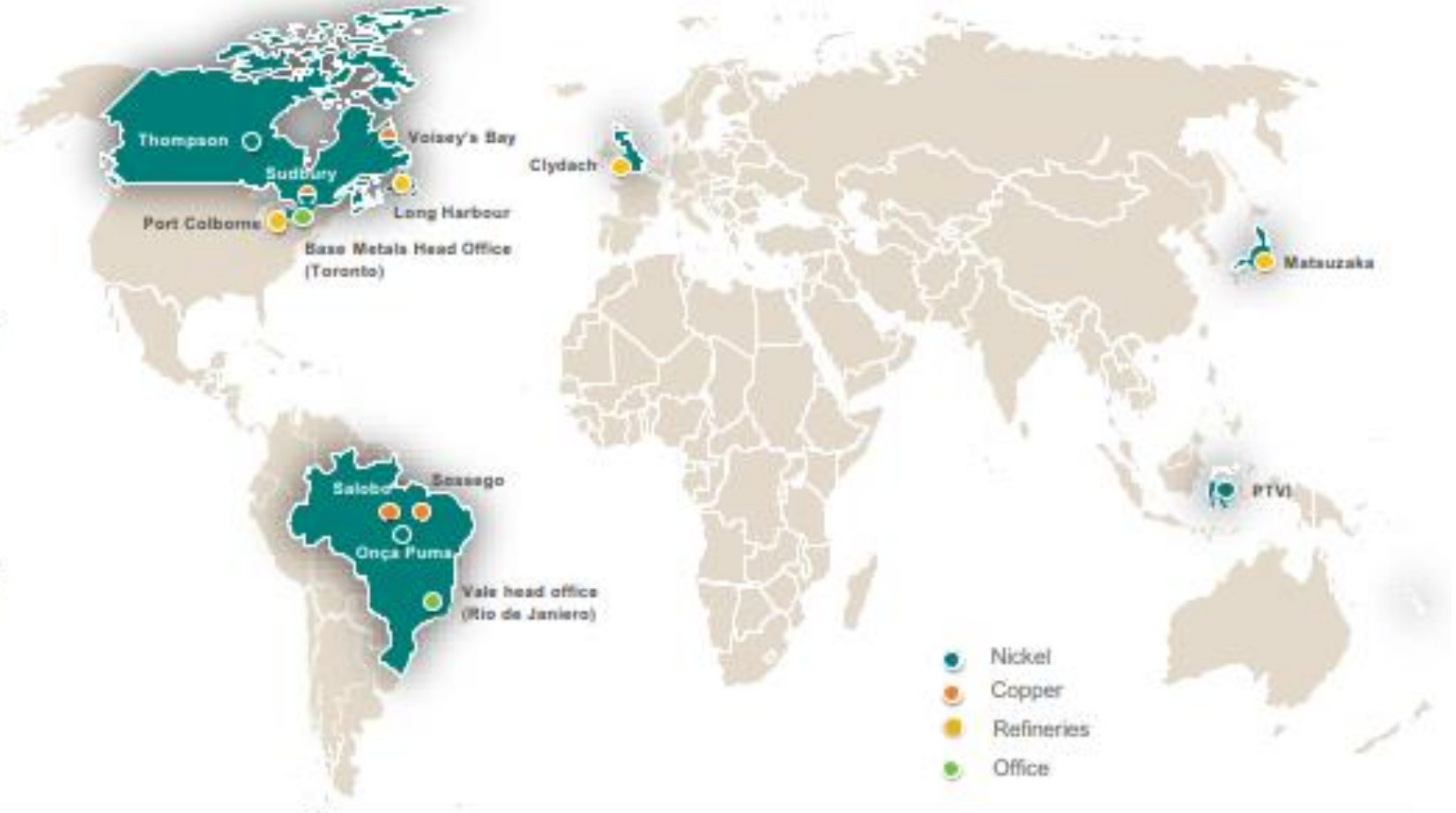
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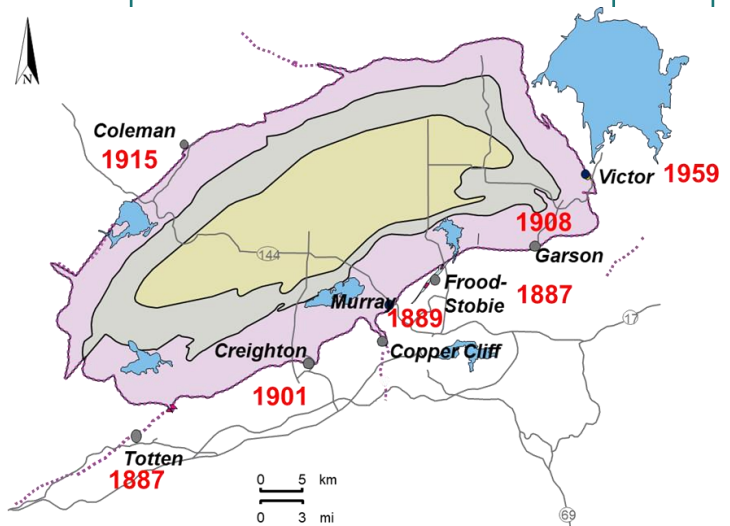
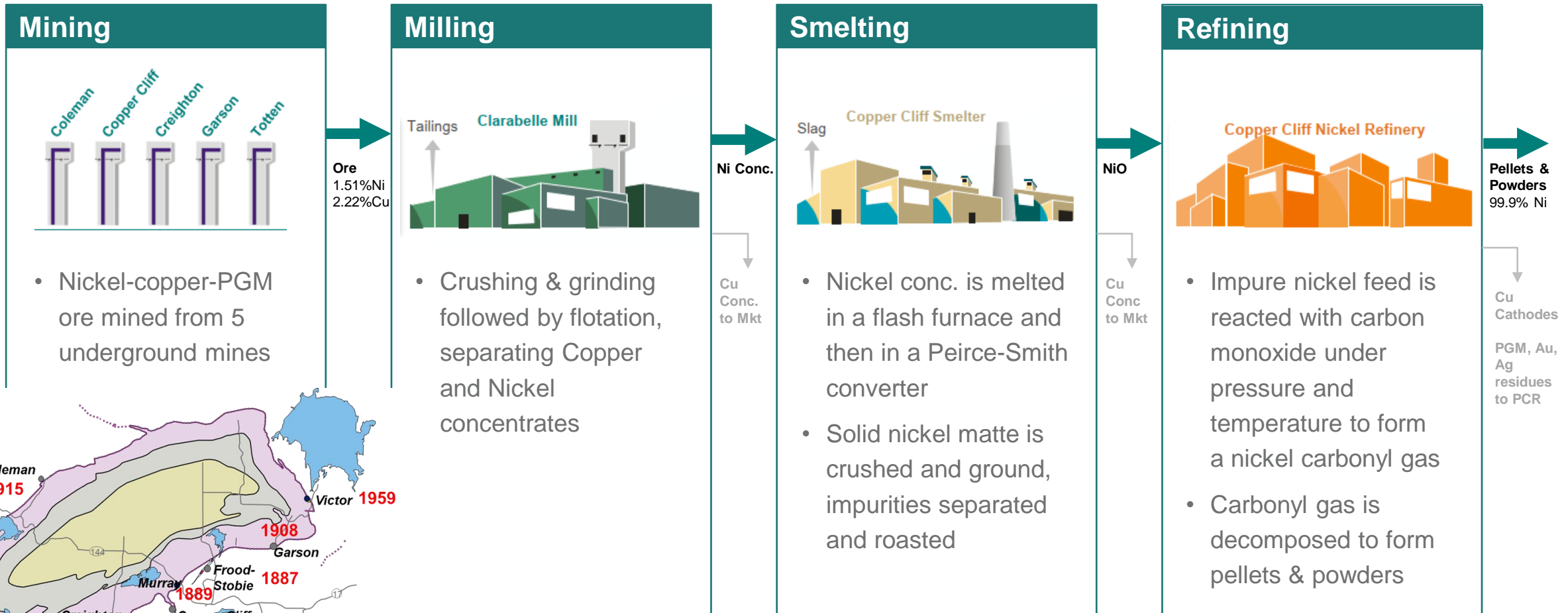
We are a global base metals leader and the largest integrated nickel producer in North America

Vale Base Metals

- Largest integrated nickel operation in North America, operating in a safe jurisdiction with a stable regulatory environment
- Headquartered in Toronto, Canada
- 8 core nickel and copper operations and 4 refineries
- 16,000 employees across the world
- World leading base metal producer



Sudbury: our mines are part of an integrated Nickel Sulphide operations to produce finished Nickel and other by-products



Vale's Economic Contribution to Canada:

Vale is proud to call Canada home – investing in safe, responsible, and sustainable mining that contributes to a strong Canadian economy.

Over the last 12 years, total investment in Canada:

\$15.5B Capital Investments

\$33.3B Operating Expenses

\$48.8 Billion

GDP Direct & Indirect Contribution:

\$58.4B

Government Revenue:
\$9.8 Billion



Employment Legacy:

We are proud to provide stable, well-paying jobs in the communities where we operate, employing a team of dedicated, high-performing people.



in labour
income over
the past
12 years.

Job Creation:

24,700

Jobs/year across Canada



*Annual average
jobs created
directly and
indirectly over the
past 12 years.

In 2020:

Vale directly
employed:

6,170

people across Canada



\$1.08B

In total wages



Vale's direct
share of Canada's
mining sector GDP

Production Contribution:

Our Base Metals operations help Canada rank as the 6th largest nickel-producing country and the 11th largest copper-producing country in the world.



of all
nickel
produced
in Canada
in 2020



of all
copper
produced
in Canada
in 2020

**Came from a
Vale operation**

In 2020 we produced:

Ni

99,000
tonnes of
nickel

Cu

93,000
tonnes of
copper

Fact: More than two-thirds of the world's nickel is used to produce stainless steel.

Fact: Copper is the third most-used metal in the world.

Leadership in Sustainability:

We are supplying the world with the nickel, copper and cobalt to power electric vehicles, create renewable energy solutions and help develop life-saving medical equipment.

How we produce these metals matters, as we are committed to achieve net-zero emissions by 2050.

Vale's Sustainability Commitments:



33% reduction in Scope 1 & 2 GHG emissions by 2030 and achieve net-zero by 2050



Reduce new water collection by 10%



Reduce Scope 3 net emissions by 15% by 2035



Recover and protect +500,000 ha of forest by 2030



100% equivalent self-generation of clean energy

Vale meets EV market needs for low-carbon products

In October 2021, Vale received independent third-party assurance from Intertek Group Plc that the carbon footprint of our Long Harbour nickel rounds produced in Newfoundland and Labrador are about one-third of the Nickel Institute's average for Class 1 nickel. Additionally, in April 2022, the Intertek Group Plc confirmed the GHG emissions reported for our low carbon nickel pellets, powders and copper concentrates, produced in Sudbury, are some of the lowest carbon base metal products in the world.

The road to carbon reduction

We have already done



Copper Cliff Smelter in Sudbury

- US\$ 1.5 bn investment
- Reduction in emissions
 - 40% GHG from the smelter
 - 85% sulphur dioxide
 - 40% metals particulate

We are evolving...



Underground electric vehicles

- 50+ EVs operating underground

...and we will get greener



Base Metals Low Carbon Agenda

- Clean energy electrification
- Alternative fuels including biodiesel and hydrogen
- Biomass and biocarbon for process heating and reduction







Photo: Battery electric haul-truck at Creighton mine in Sudbury

What is a **Green** Energy Vehicle?

Green Energy Vehicles represent a broad scope of modern vehicle technologies including battery, fuel cell, trolley, tethered and hybrid drive systems. These innovative technologies open the door for **operational improvement** and a reduction in our global **consumption of fossil fuels**.

The four key value drivers are

-  **Health & Safety**
-  **Social Responsibility**
-  **Carbon Reduction**
-  **Financial ROI**



An electric history.

Sudbury was home to some of the earliest mining equipment electrification initiatives, starting in the 1970's.

1976



That's the new 2-yard electric scooptram, now in operation at Creighton mine. A new concept in load-haul-dump operation, the unit is operating in a cut-and-fill stoping complex on the 6600 level.

Tethered 2-yard electric LHD at Creighton Mine (6600 Level)

1987



Crean Hill Mine operated as **All-Electric Mine**

1996



Trolley electric truck haulage initiated at Coleman Mine

2017



1st battery electric LHD underground at Coleman Mine

2022



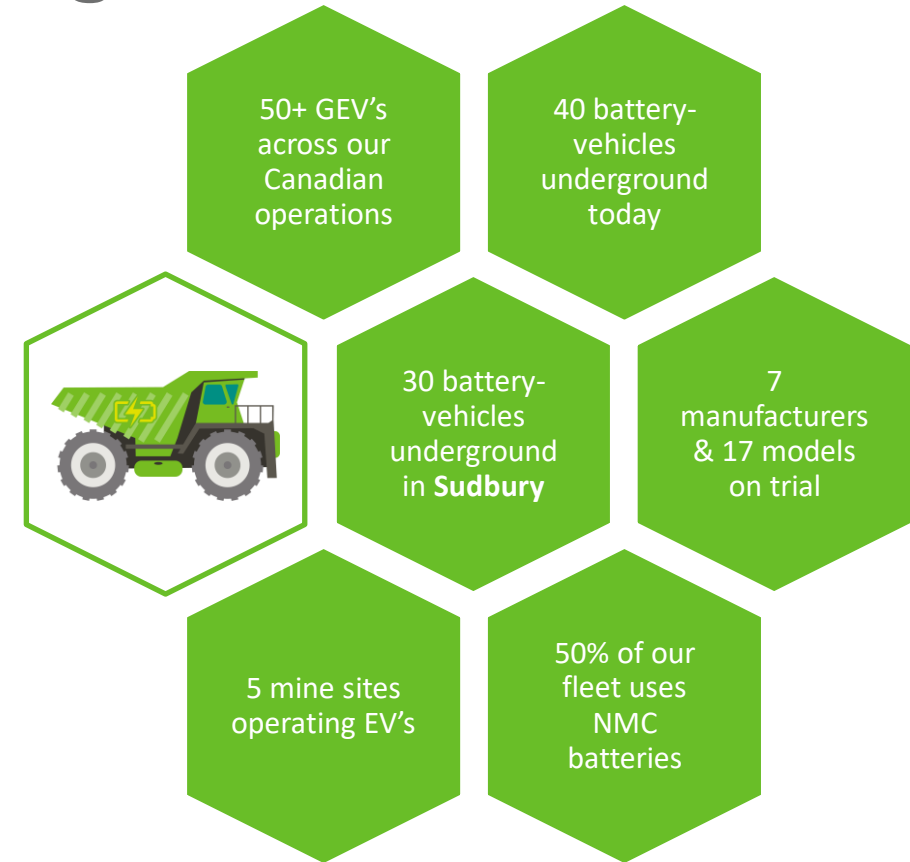
First-of-their kind BEV's arrive at Creighton & Copper Cliff Mines



Vale's Green Energy Vehicle Program.

A diverse fleet of BEV trial equipment allows for expedited technology development & decision making.

Working with our equipment manufacturers has been key. Local OEM presence in Sudbury continues to be vital.

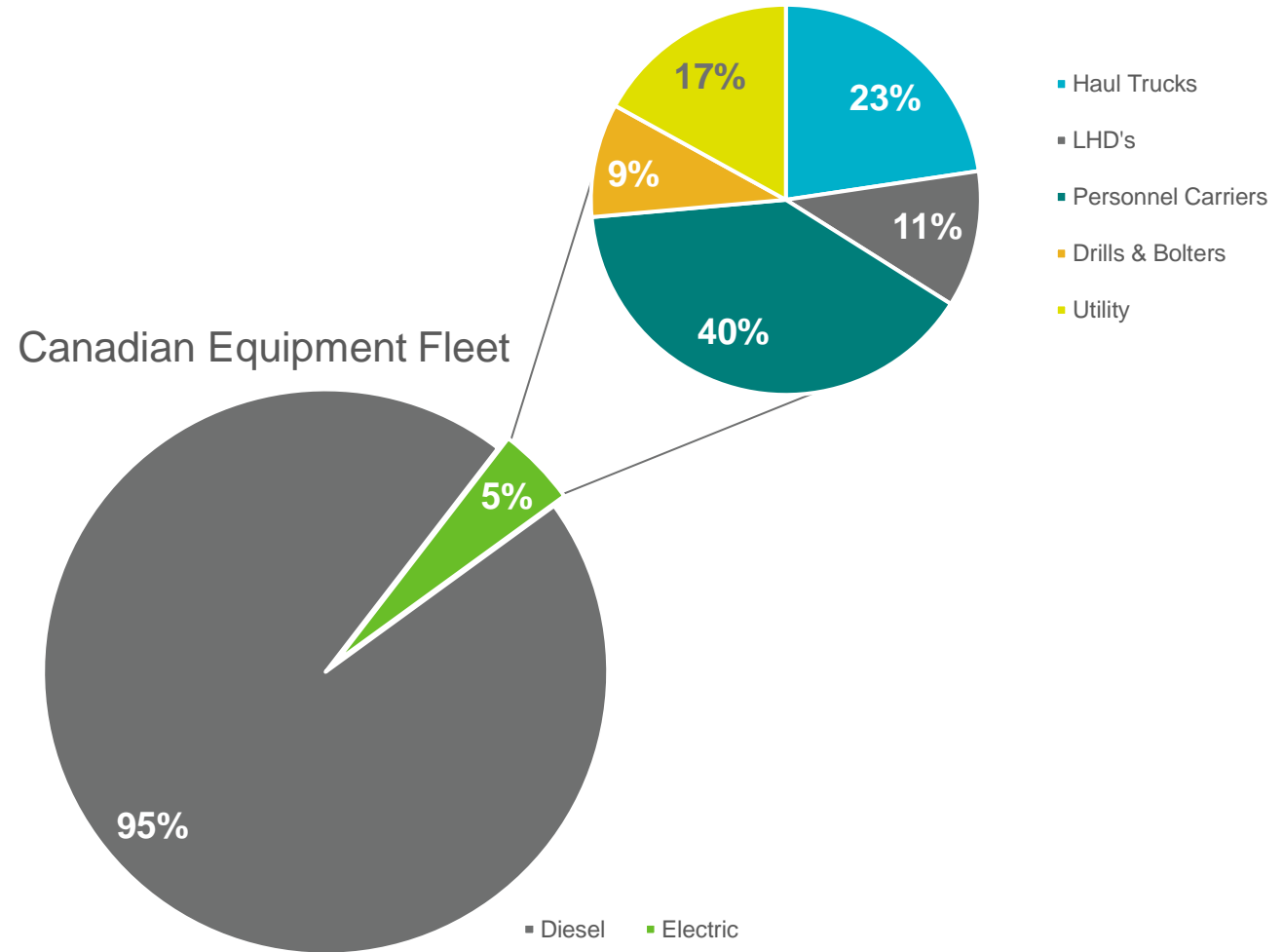


50+ GEV's in Canada

Investing in 5% to guide the remaining 95%.

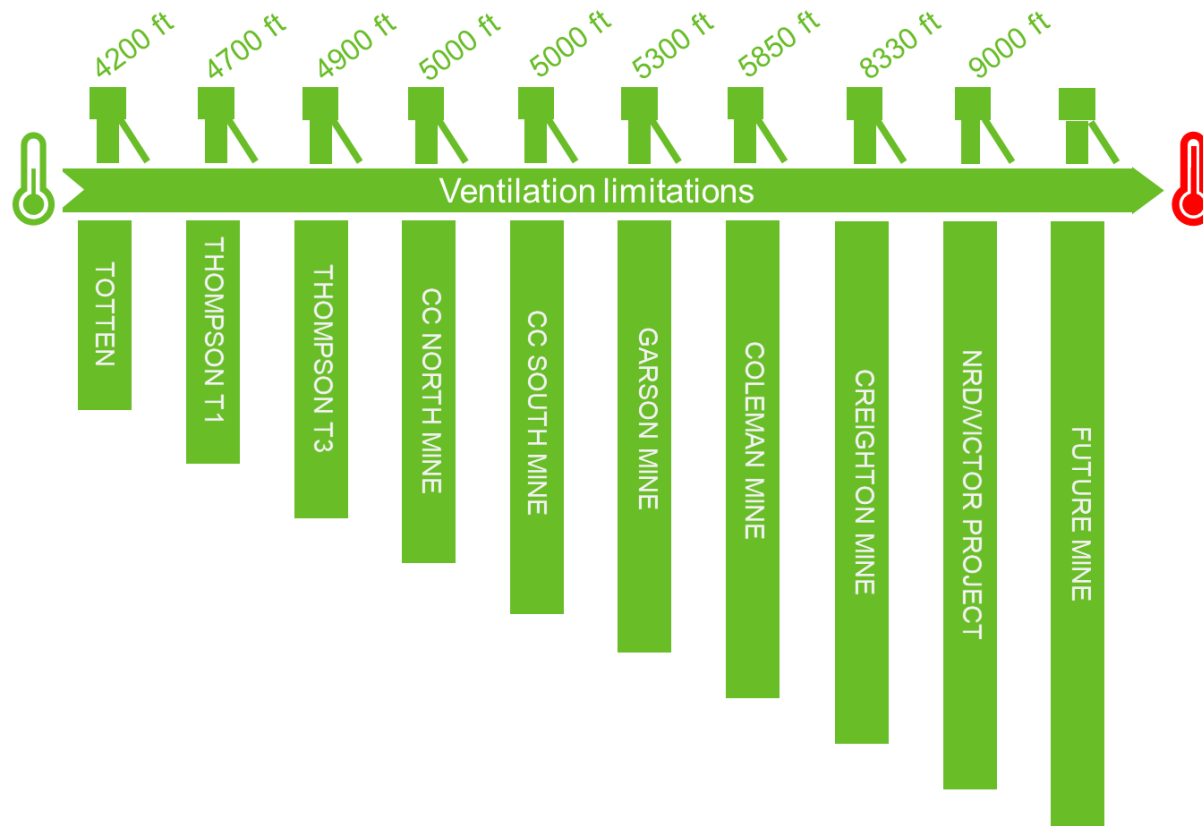
KPI's to determine long-term viability of EV's in mining

- Operational feedback
- Vehicle data/telemetry
- Workplace environmental monitoring
- Vehicle performance



EV's & workplace conditions.

Of operators surveyed, 71% reported feeling better after a shift when operating an EV as compared to a diesel equivalent.



“...older & deeper mines require more energy to access and extract the same amount of ore.”

- 2018 Facts & Figures, The Mining Association of Canada

- Air quality
- Noise
- Temperature
- Production
- GHG



Creighton Mine Pilot.

- 33 EV's
- 8460ft (over 2.5 km) below ground
- Long life ahead
- Project study – down to 10,000ft
- Ventilation challenges & high temperatures
- Confined mining area
- Early adopters of EV technology
- Engaged workforce
- Electric future



A global approach to green vehicle technology.

Strong ties between underground and surface electrification initiatives allow for transparent learnings & shared benefit across the business.



Sudbury ON, Thompson MB,
home to Vale's largest Green
Energy Vehicle trial fleet (50
vehicles)

**Minas Gerais, CAT 793D 256t haul
truck engine hydrogen injection trials**



**PTVI + Agua Limpa, 72T
battery haul truck trials**



**Carajas Mine, haul truck trolley
assist project (ETC. 2023)**

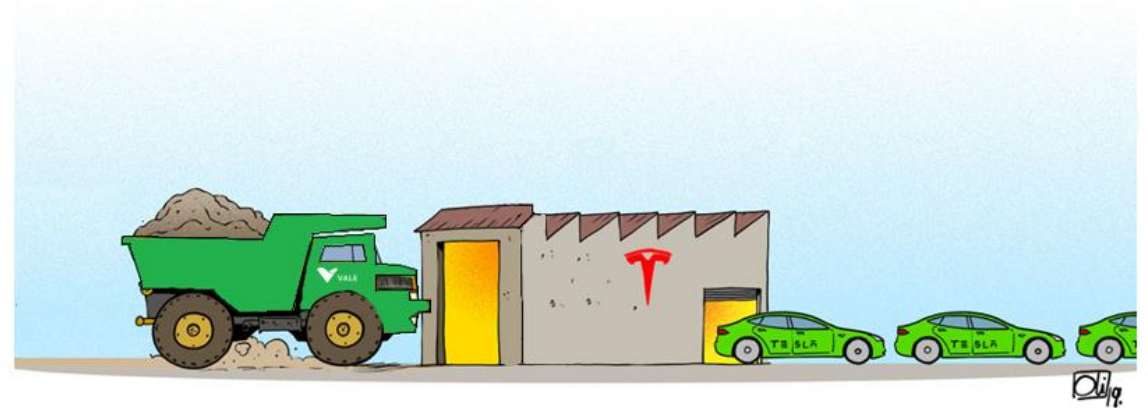
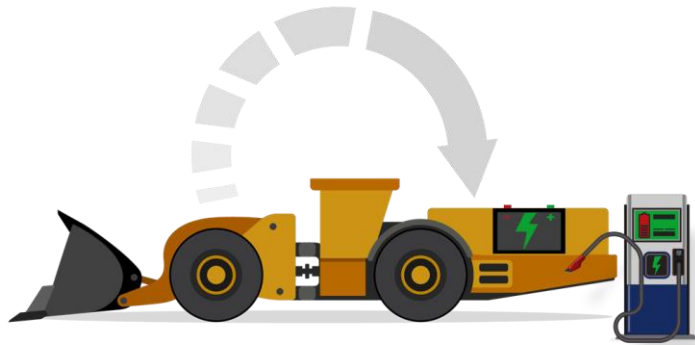
**Tubarao Complex, Vitoria, Vale's
1st battery-electric locomotive**



Going full circle.

As the demand for on-road EV's grows, Vale is keeping pace by reducing its contribution to the carbon footprint of EV manufacturing.

The use of modern Li-ion battery technology allows us to mine for the very same minerals found in the batteries themselves.



Photos: Battery electric LHD at Copper Cliff mine in Sudbury



